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Connell

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(54) **LATCH MECHANISM**

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(51) **Int. Cl.**

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E05C 3/14	(2006.01)
E05B 17/20	(2006.01)
E05B 35/00	(2006.01)
E05C 19/00	(2006.01)
E05B 15/02	(2006.01)
E05B 15/04	(2006.01)

(52) **U.S. Cl.**

CPC ***E05C 3/145*** (2013.01); ***E05B 17/2019*** (2013.01); *E05B 35/008* (2013.01); *E05B 2015/023* (2013.01); *E05B 2015/0468* (2013.01); *E05C 19/006* (2013.01); *Y10T 29/49826* (2015.01); *Y10T 292/1078* (2015.04)

(58) **Field of Classification Search**

CPC H05K 5/0221; H05K 5/0013

See application file for complete search history.

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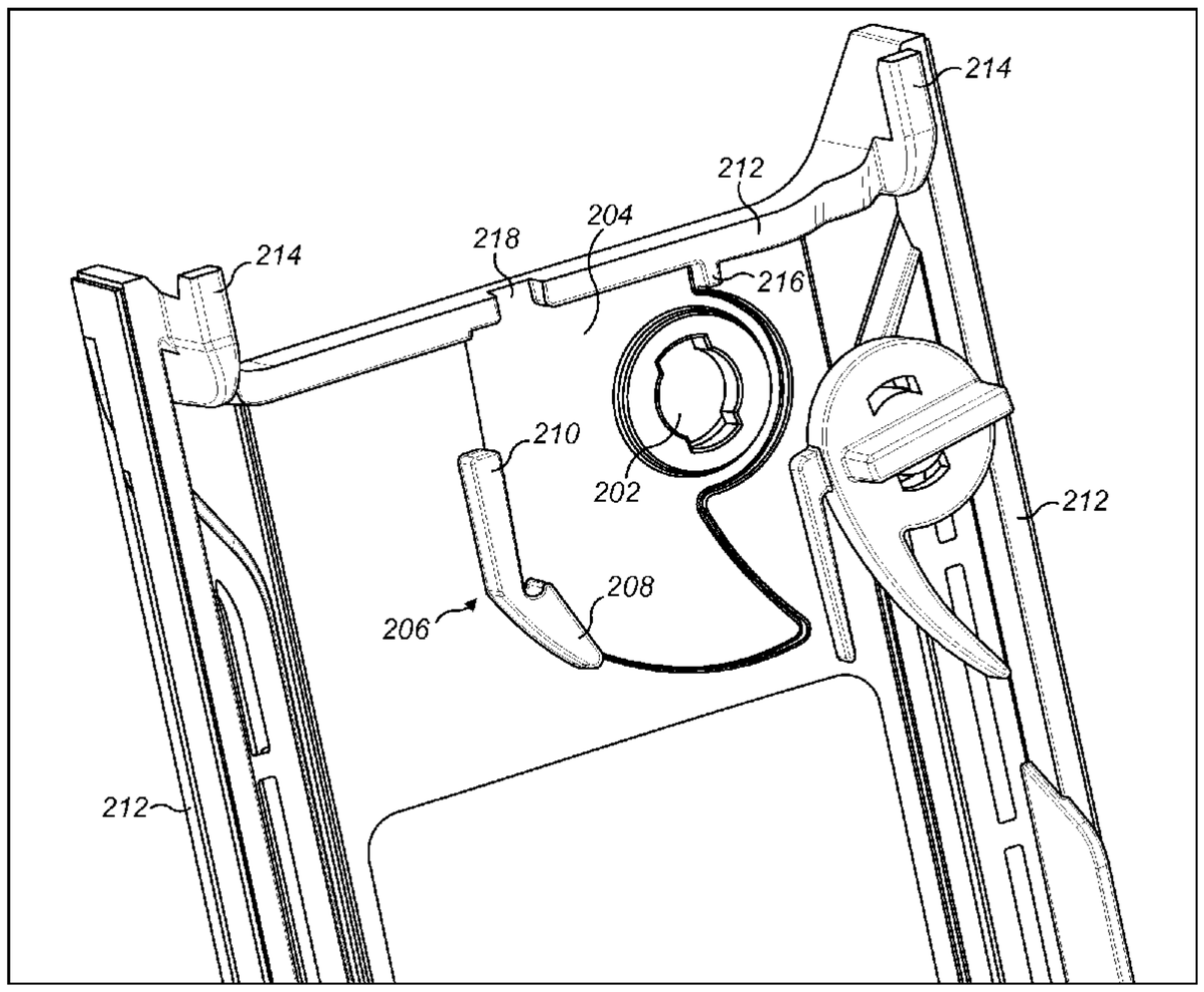
(57) **ABSTRACT**

A latch mechanism is provided comprising a latch and a cover arranged for attachment to the latch. The latch includes a latch body and a projection extending therefrom wherein, when the latch and cover are attached to one another, the projection extends from an inner surface of the cover. The latch mechanism further comprises a docking area located on a device, the docking area being arranged to receive the latch such that the cover may be securely fixed to the device. When the cover is placed over the docking area, a sliding movement of the cover causes actuation of the latch to secure the cover to the docking area. When the cover is secured in the docking area, further sliding movement of the cover is prevented.

20 Claims, 12 Drawing Sheets



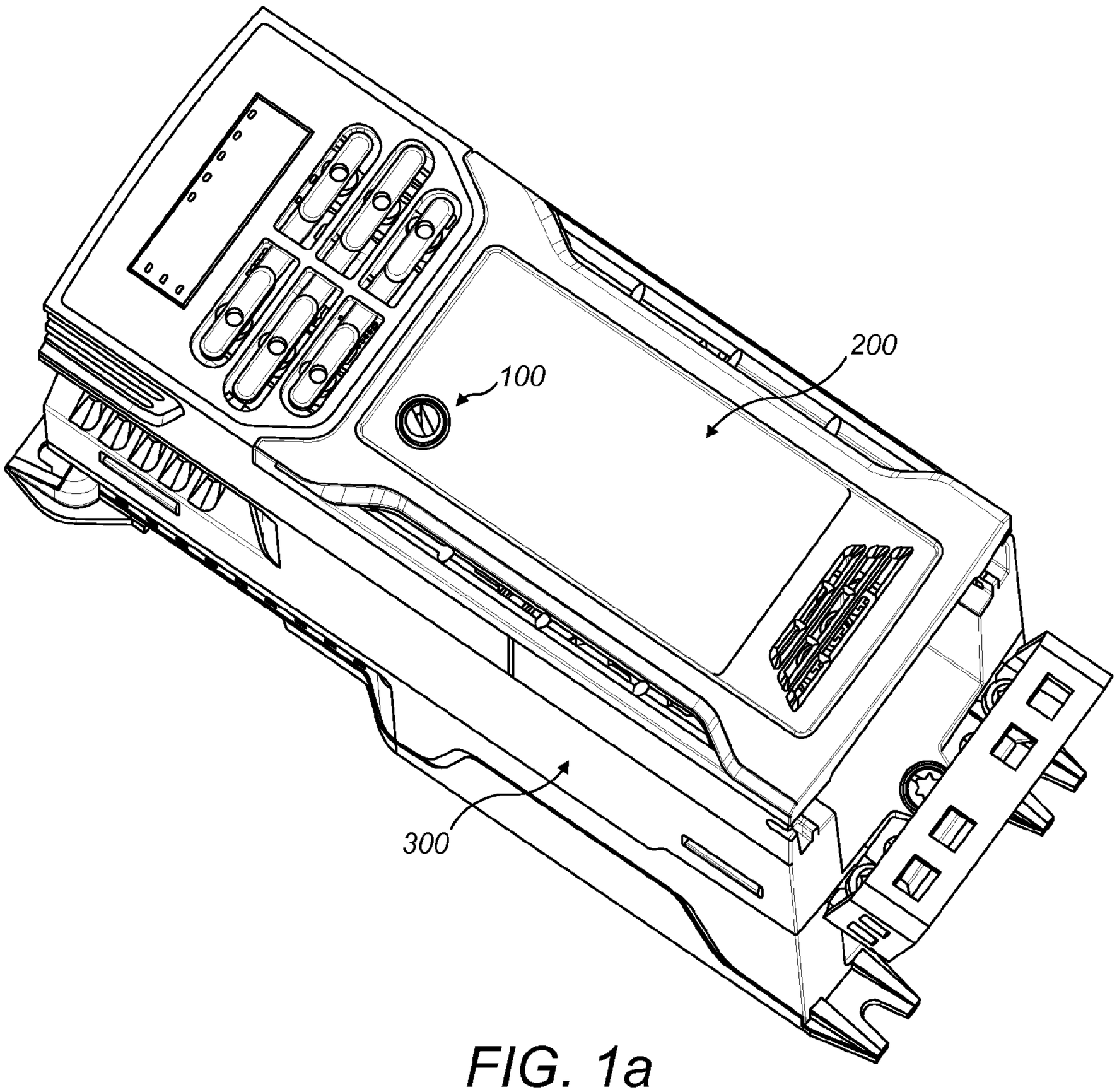


FIG. 1a

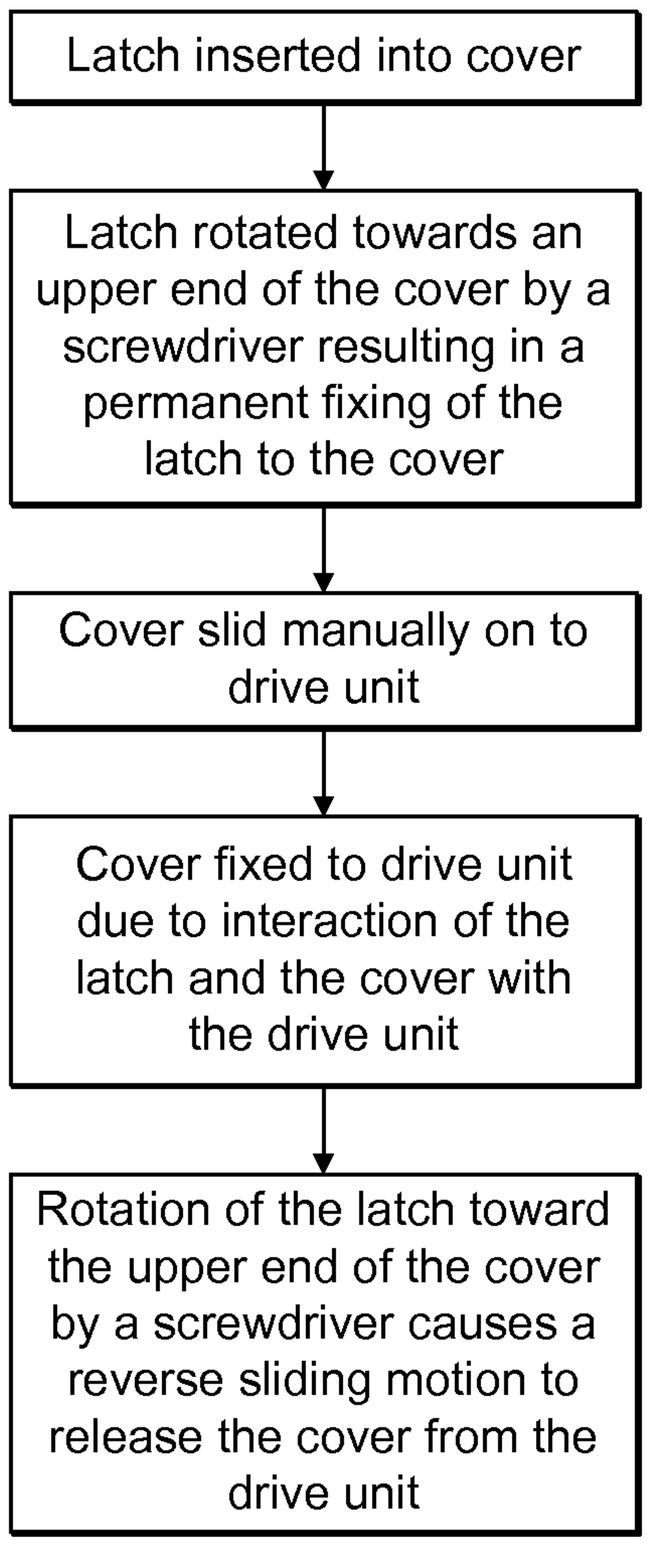

Latch inserted into cover
Latch rotated towards an upper end of the cover by a screwdriver resulting in a permanent fixing of the latch to the cover
Cover slid manually on to drive unit
Cover fixed to drive unit due to interaction of the latch and the cover with the drive unit
Rotation of the latch toward the upper end of the cover by a screwdriver causes a reverse sliding motion to release the cover from the drive unit

FIG. 1b

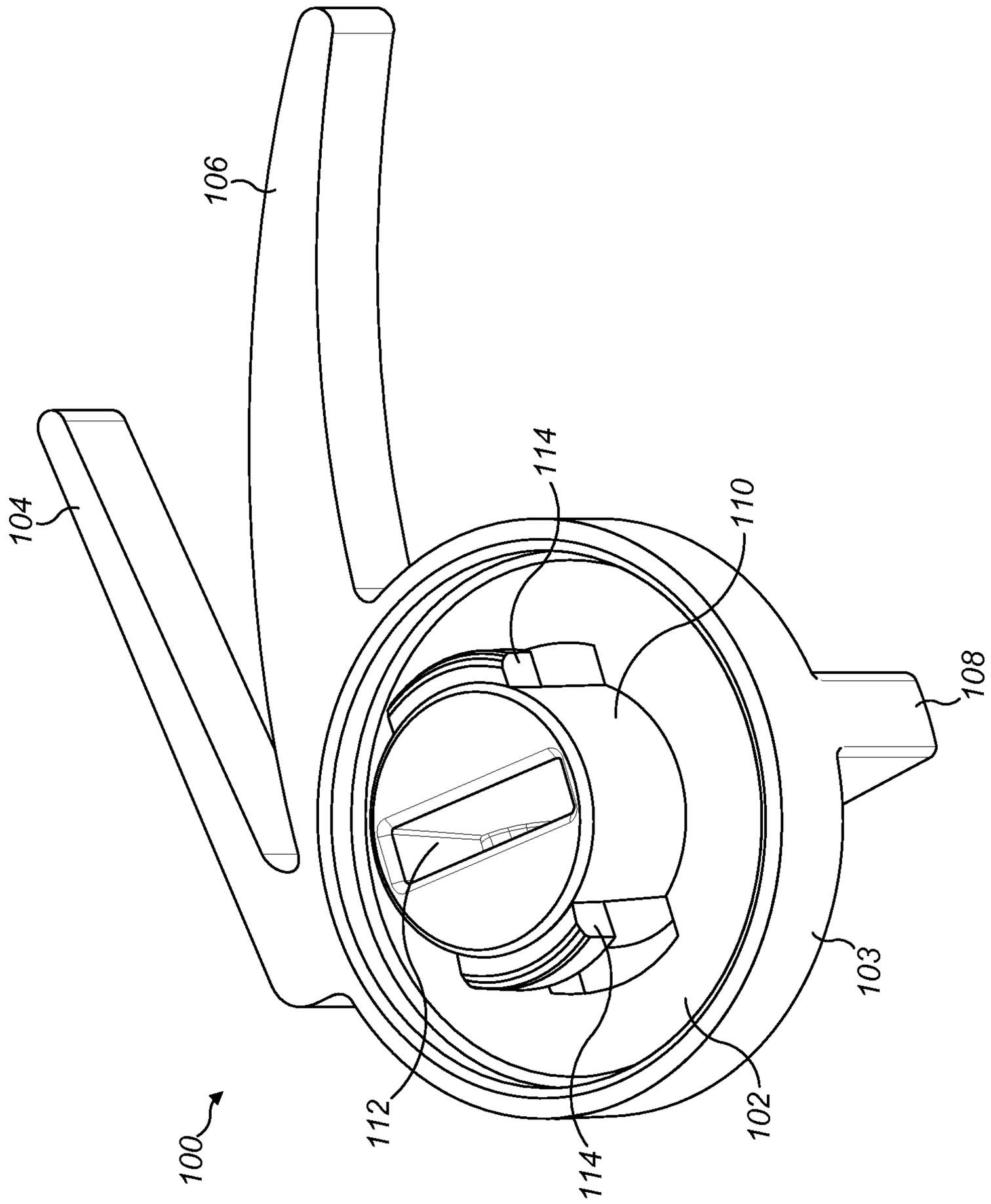


FIG. 1c

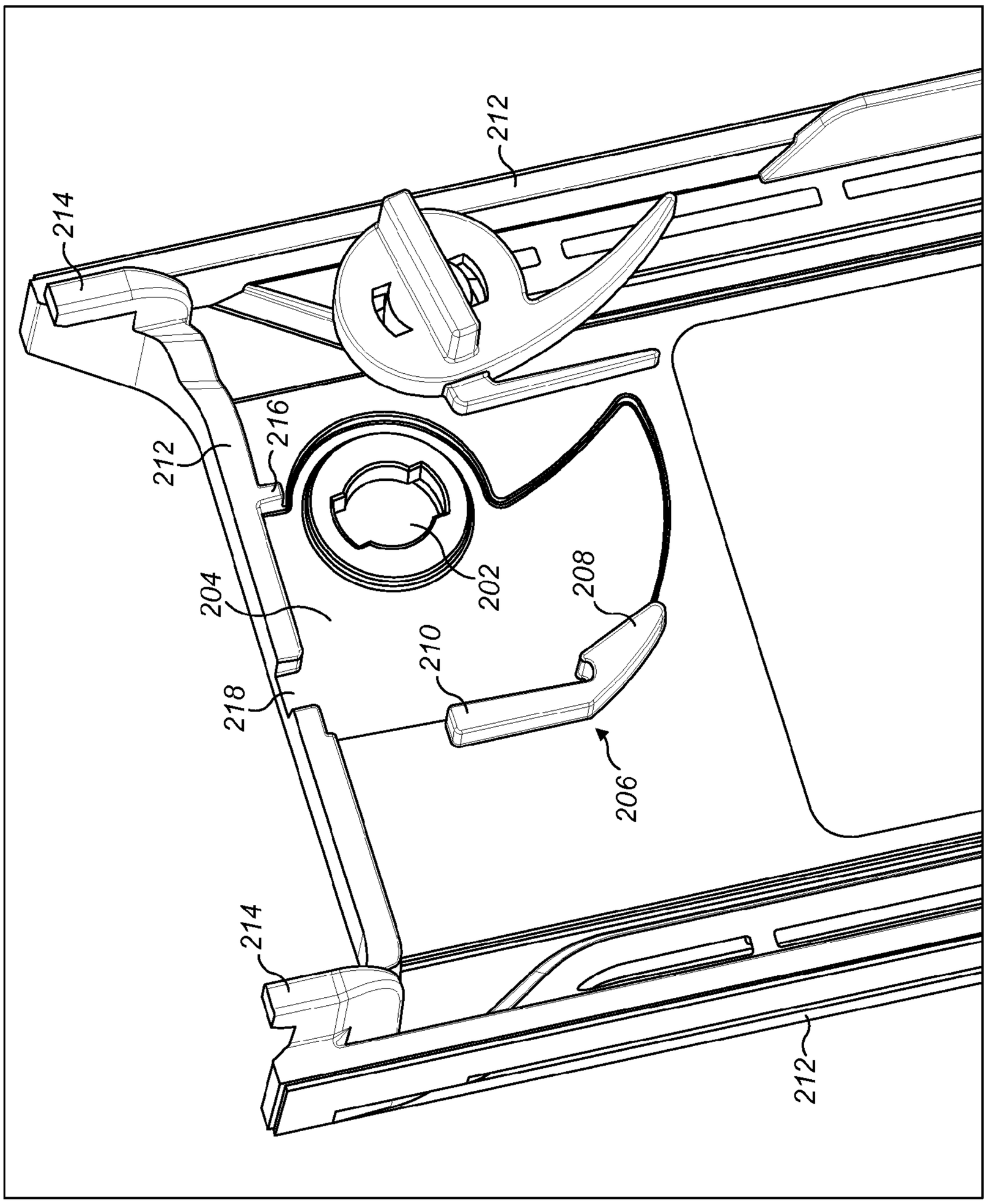


FIG. 2a

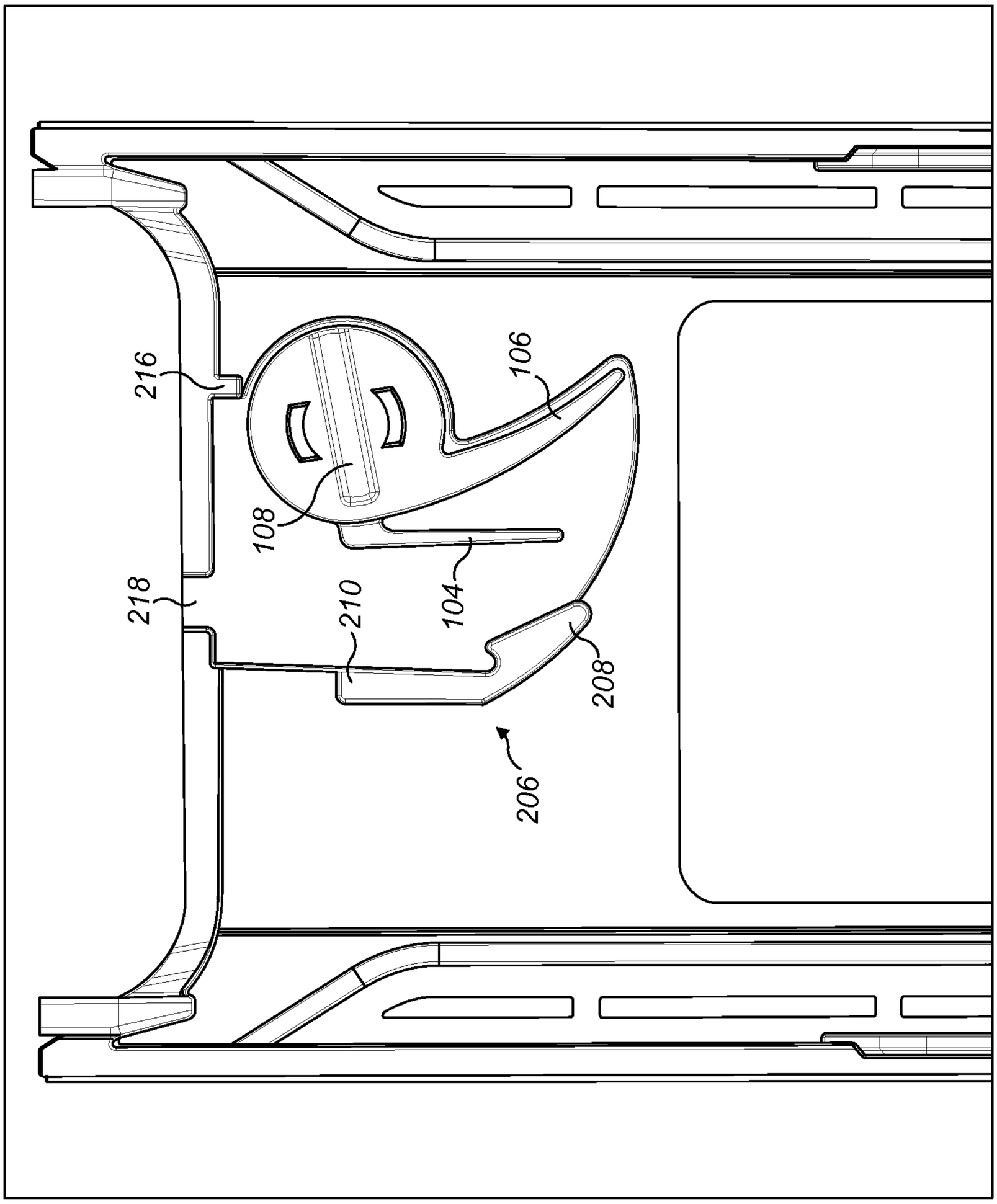


FIG. 2b

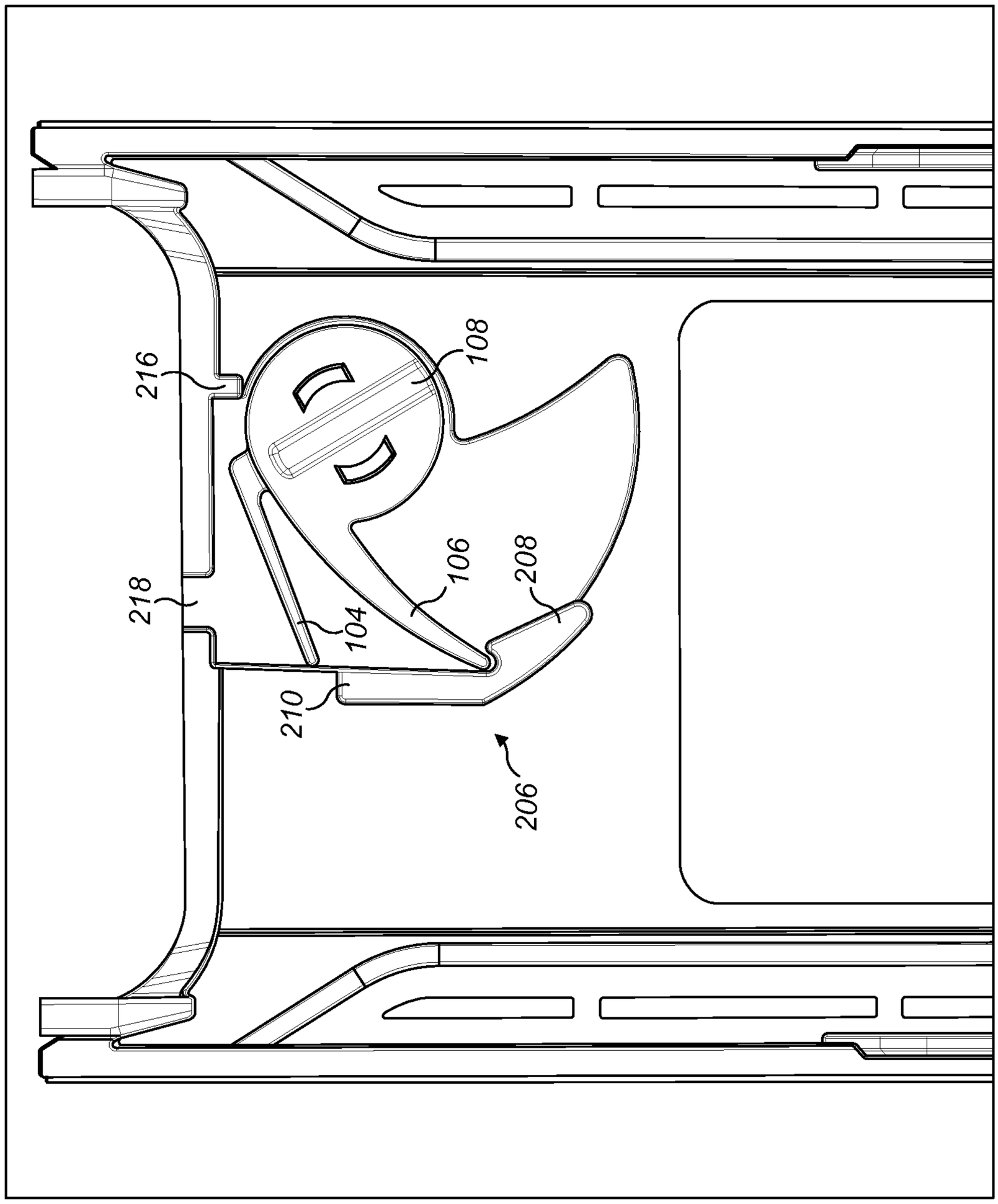


FIG. 2c

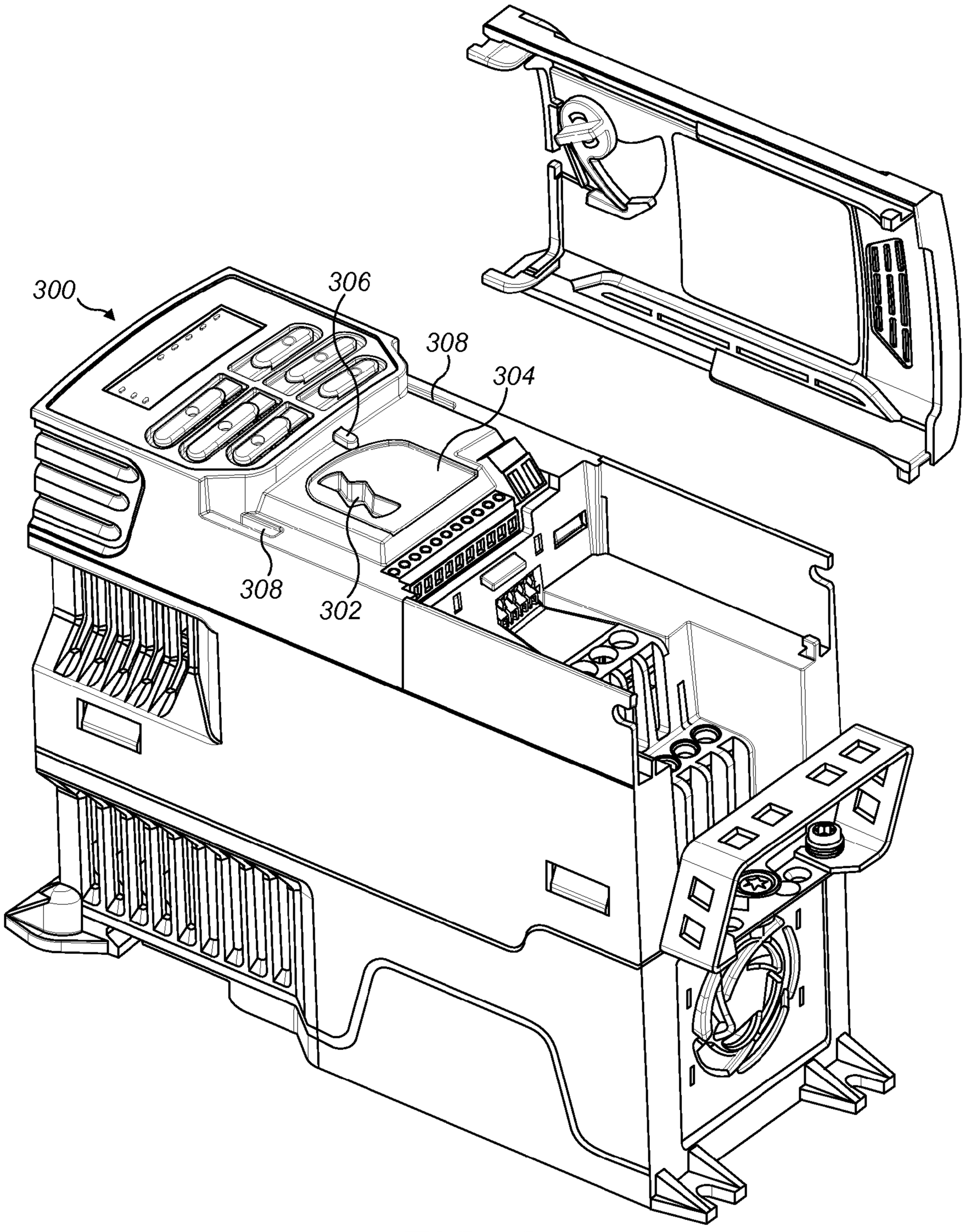


FIG. 3a

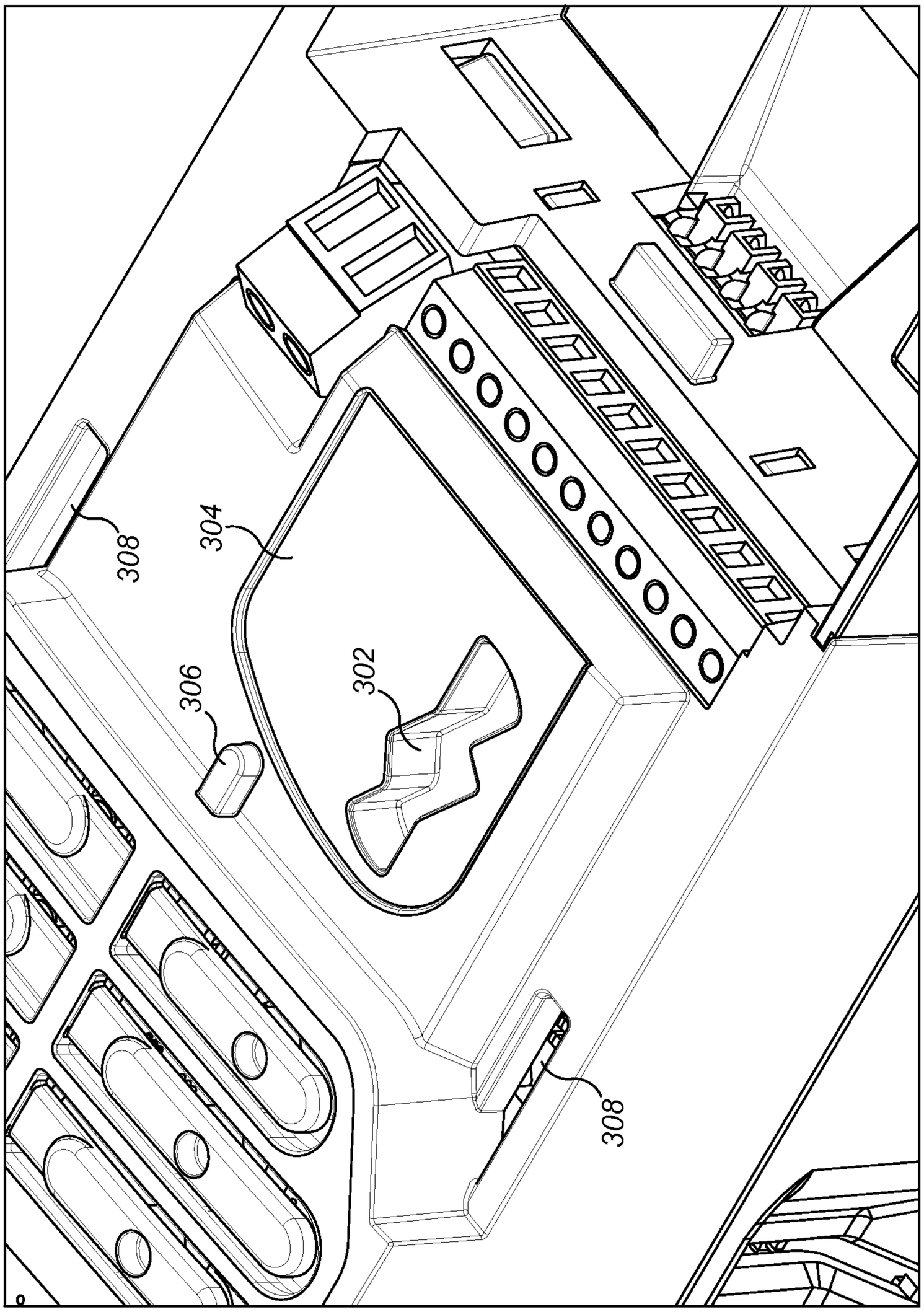


FIG. 3b

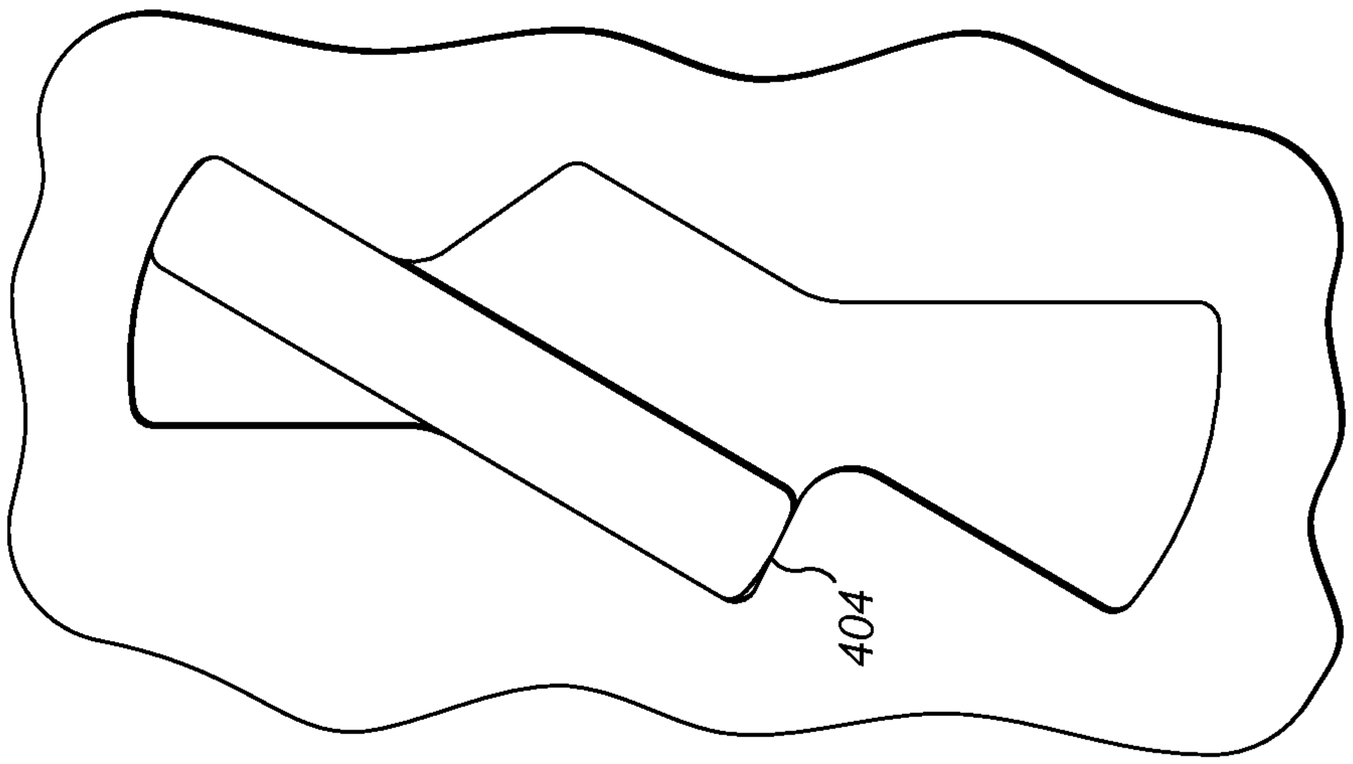


FIG. 4c

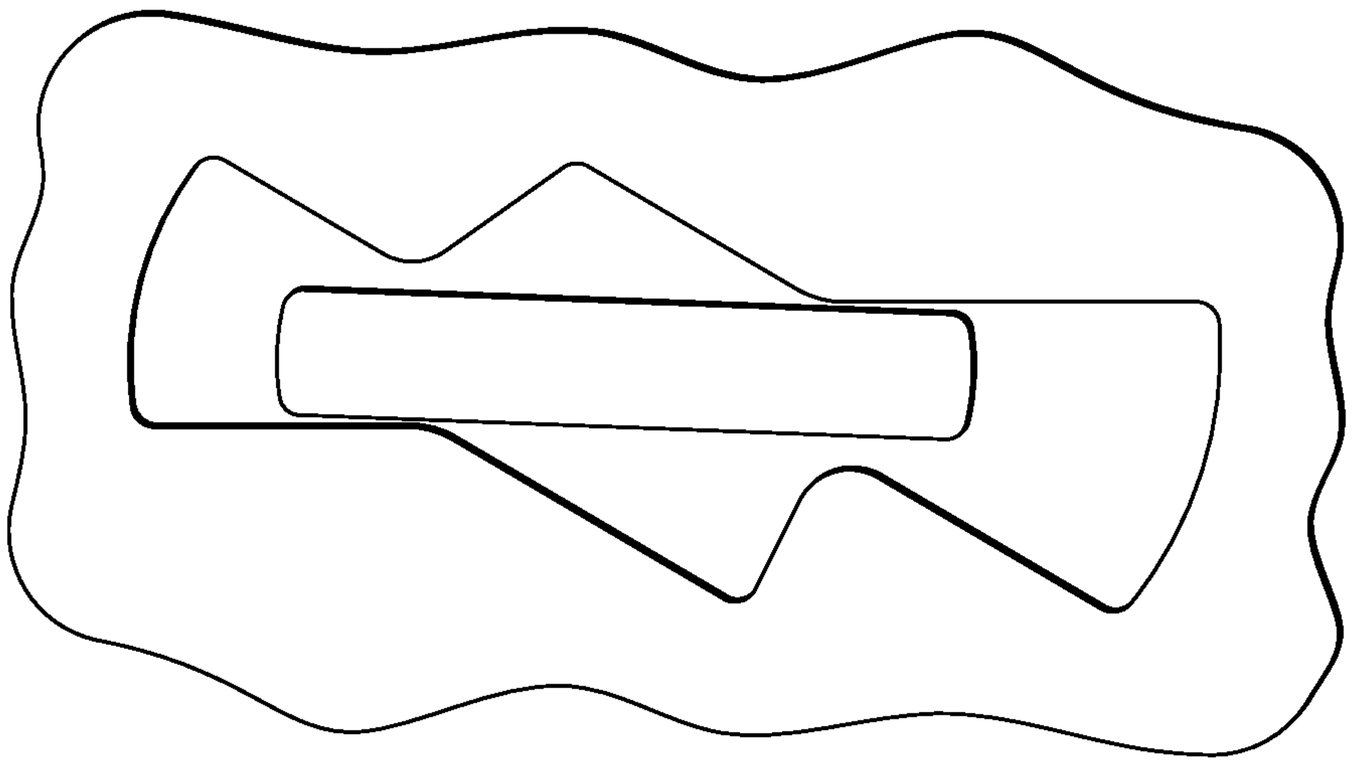


FIG. 4b

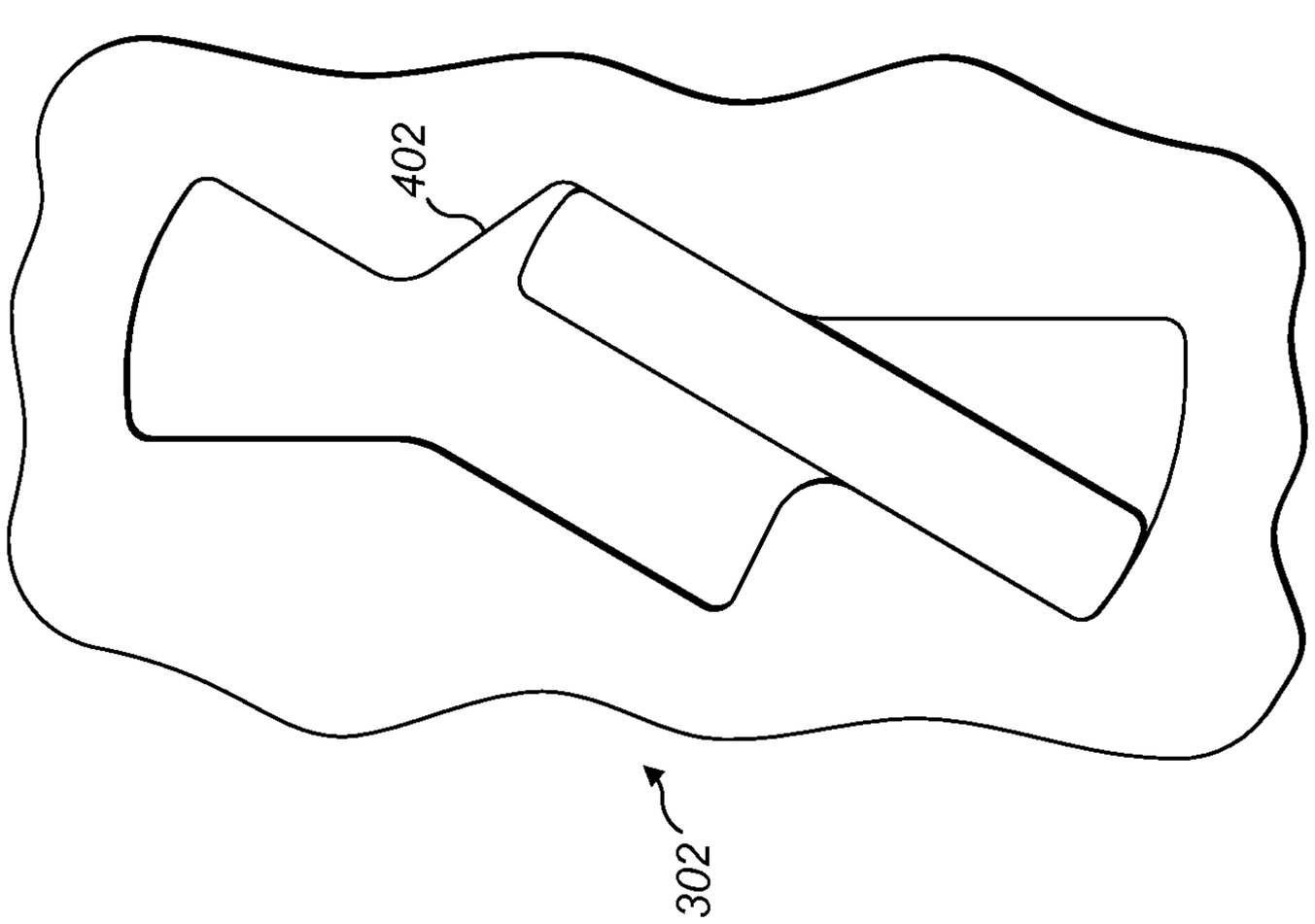


FIG. 4a

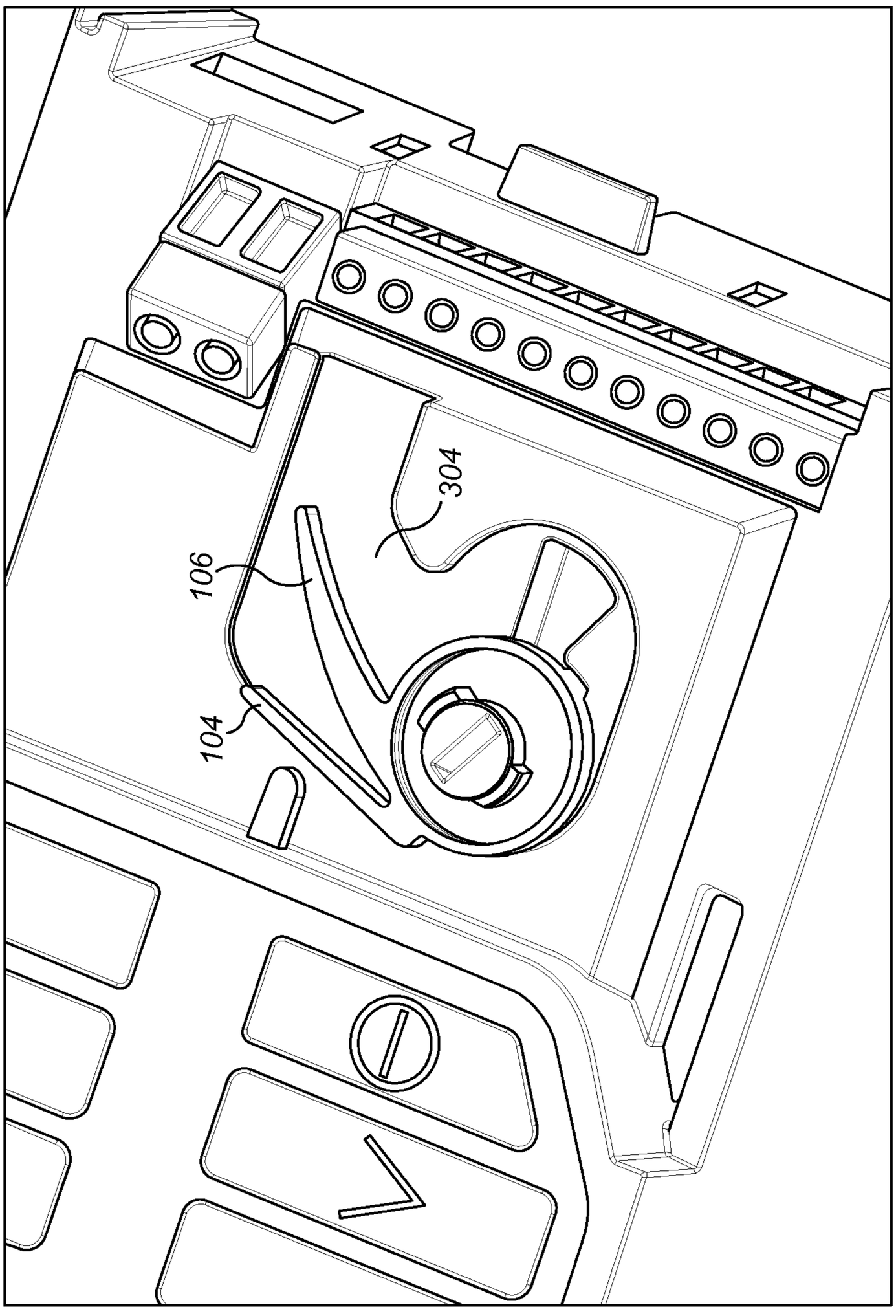


FIG. 5

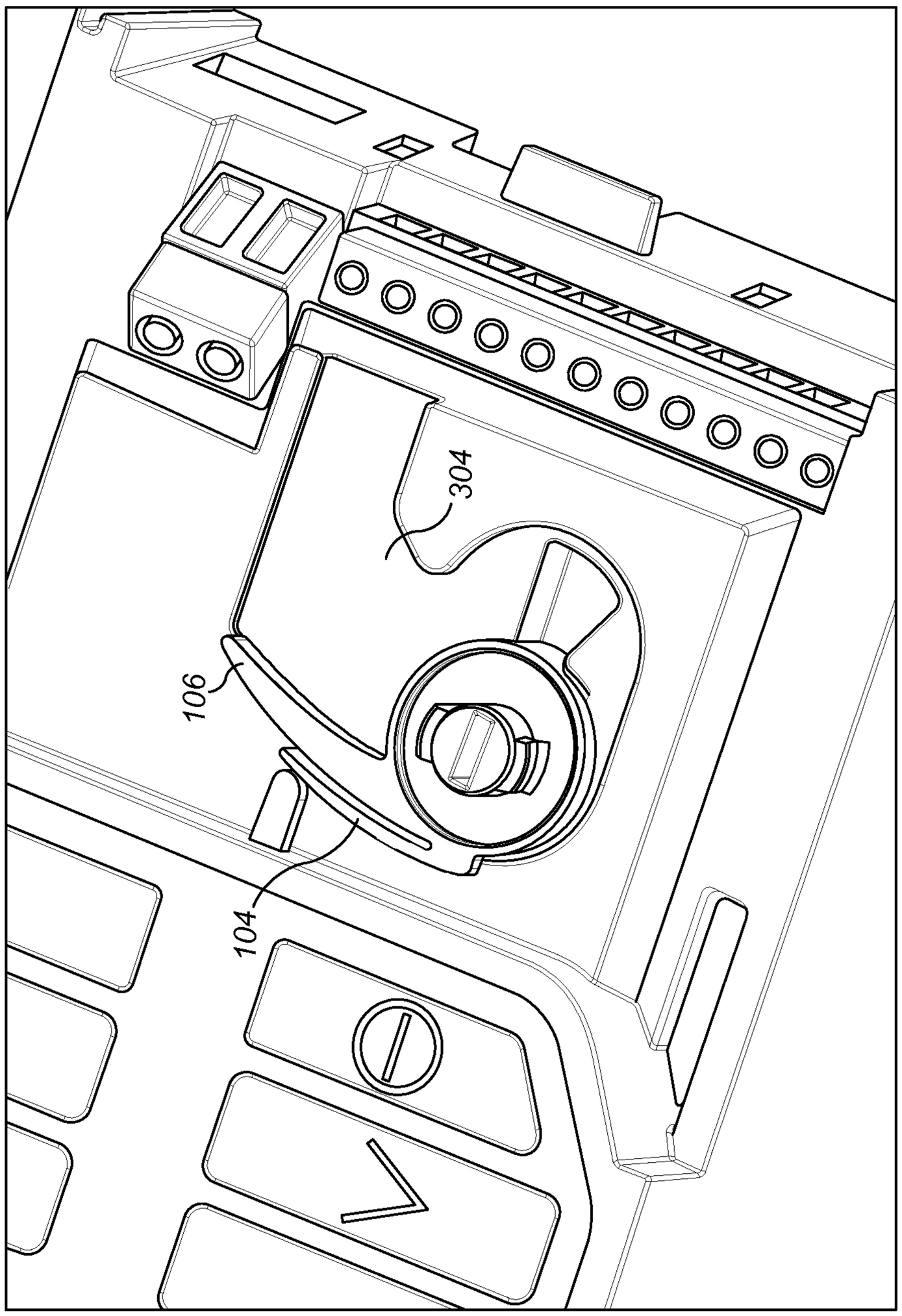


FIG. 6

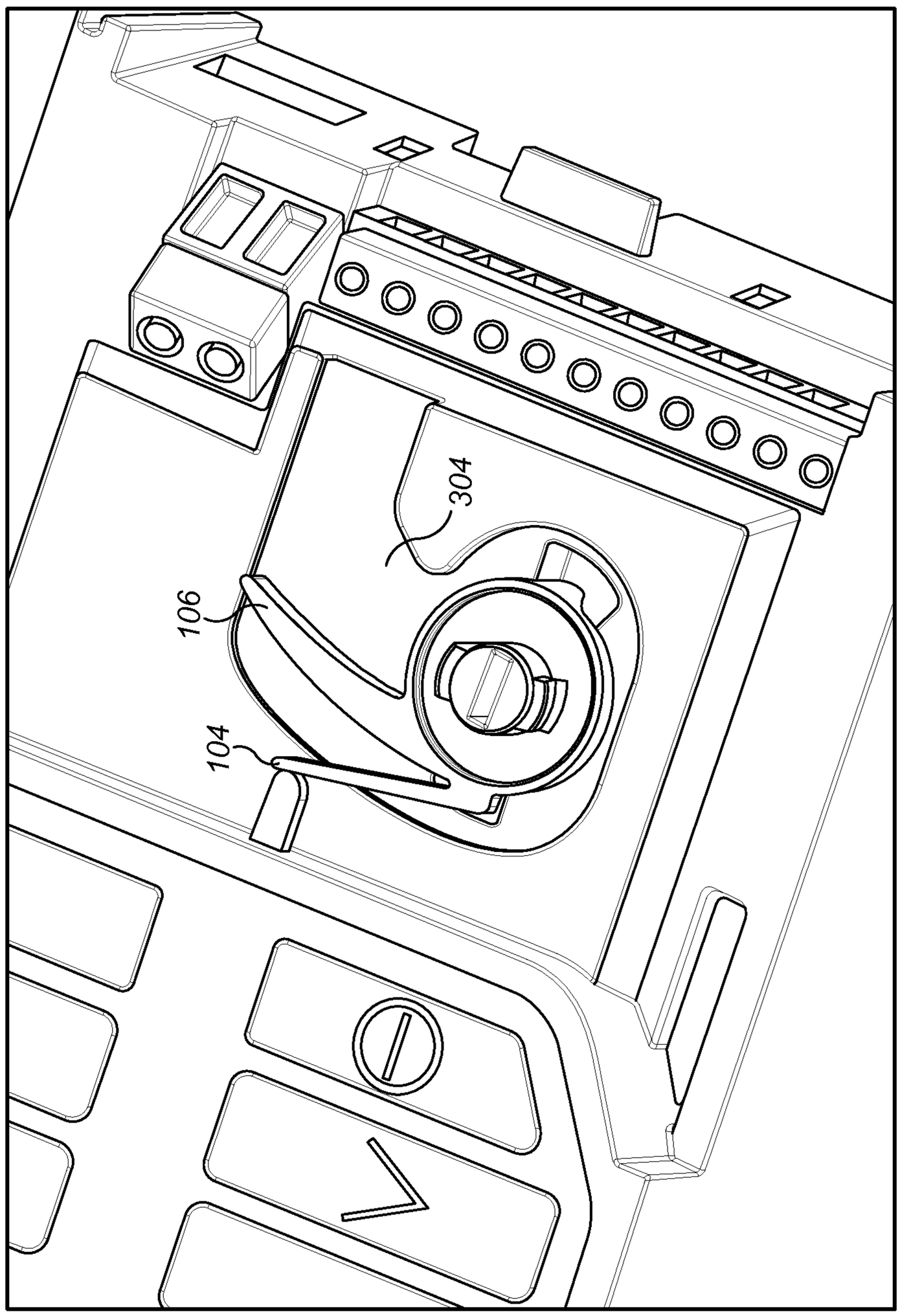


FIG. 7

LATCH MECHANISM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit and priority of Great Britain Patent Application No. GB 1203334.6 filed Feb. 24, 2012. The entire disclosure of the above application is incorporated herein by reference.

FIELD

The invention relates to a latch mechanism. In particular it relates to a latch for use with a cover and a drive unit.

BACKGROUND INFORMATION

It is common for electrical devices and other sensitive devices to require a cover to provide both protection of the device and safety for the user of the device. Generally, the covers of such devices are required to be removable such that the device is accessible for maintenance or alteration, for example. Conventionally, fittings such as screws are used so that the cover may be securely attached to the device while still allowing the possibility of removing and replacing the cover. Electrical standards also require the cover to be tool-removable.

The removal of screws is a time consuming process requiring the individual removal of often a large number of screws manually. Additionally, the screws are easily lost or dropped inside the device which may cause damage to the device and produce additional safety risks to the user. The loss of one or more screws impacts the effectiveness of the device cover permanently unless the screw is replaced. Continual removal and replacement of screws may also lead to the screw heads becoming damaged, thereby rendering removal of the screws and device cover impossible.

There is a desire for a means of attaching a cover to a device that is quick, safe and efficient.

SUMMARY

An invention is set out in the claims.

According to an aspect there is provided a latch mechanism comprising a latch and a cover arranged for attachment to said latch. The latch itself includes a latch body and a projection extending therefrom wherein, when the latch and cover are attached to one another, the projection extends from an inner surface of the cover. The latch mechanism further comprises a docking area located on a device, said docking area being arranged to receive the latch such that the cover may be securely fixed to the device. The docking area includes a guiding hole comprising a first hole portion and a second hole portion, each arranged to receive the projection which extends from the latch body. When the cover is placed over the docking area and the projection is received in the first hole portion, a sliding movement of the cover causes actuation of the latch so that the projection moves from the first hole portion to the second hole portion wherein, when the latch is received in the second hole portion, further sliding movement of the cover is prevented. Preferably the latch is rotatable with respect to the cover and comprises a release arm and a stopping arm, both extending from the latch body. The docking area or cover may comprise a guiding structure including a first, wedge-shaped portion and a second portion comprising a guiding edge. Actuation of the latch may cause a distal end of the stopping arm to sit in a seat formed between the wedge-shaped portion and the guiding edge of the guiding structure thereby locking the latch to the cover.

The docking area may comprise an obstructing protrusion positioned to abut against the release arm of the latch after a predetermined actuation of the latch, wherein said abuttal provides a force to help release the cover from the device.

The latch may comprise a first formation extending from the latch. Alternatively, the first formation may be incorporated into the release arm. The cover may comprise a second, co-operating formation wherein the first formation will contact the second co-operating formation during actuation of the latch, in order to limit the extent of the actuation of the latch. The second formation may instead be located on the docking area to perform the same function.

The latch may comprise opposite first and second faces, said first face having the projection and said second face having a protrusion thereon. The latch may comprise a slot to enable rotation of the latch via a tool. The slot may be shaped to accommodate the head of a screwdriver, and may be located on the protrusion. Alternatively, the protrusion may be shaped to be rotatable by a tool directly.

The cover may comprise one or more hooks extending from said cover and the docking area may comprise one or more retention holes arranged to receive one or more of the hooks on the cover.

According to another aspect there is provided a method of fixing a cover to a device via a latch mechanism, said latch mechanism comprising a latch securely fitted to a cover, said latch including a latch body and a projection extending from an inner surface of the cover. The method comprises fitting the latch and the cover to a docking area located on a device, said docking area being arranged to receive the latch such that the cover may be securely fitted to the device. The docking area includes a guiding hole comprising a first hole portion and a second hole portion, each arranged to receive the projection. The fitting includes placing the cover over the docking area such that the projection is received in the first hole portion and sliding the cover to cause the actuation of the latch so that the projection moves from the first hole portion to the second hole portion wherein, when the latch is received in the second hole portion, further sliding of the cover is prevented.

According to another aspect the device to which the cover is fixed is a drive unit.

According to another aspect there is provided an assembly including a device and a cover fitted to the device via a latch mechanism as described herein.

FIGURES

Embodiments and examples will now by described with respect to the appended figures of which:

FIG. **1***a* shows an example latch, cover and drive unit configuration;

FIG. **1***b* shows a flow diagram showing the operation steps of the latch mechanism;

FIG. **1***c* shows a latch;

FIG. **2***a* shows a cover for use in conjunction with the latch of FIG. **1***c;*

FIG. **2***b* shows a plan view of the latch of FIG. **1***c* attached to the cover of FIG. **2***a* and in a "relaxed" position;

FIG. **2***c* shows a plan view of the latch of FIG. **1***c* attached to the cover of FIG. **2***a* and in an "operating" position;

FIG. **3***a* shows a drive unit docking area for use in conjunction with the cover of FIG. **2***a* and the latch of FIG. **1***c;*

FIG. **3***b* shows a close up view of the docking area of FIG. **3***a;*

FIG. **4***a* shows a plan view of the guiding bar of the latch of FIG. **1***c* in the guiding hole of the docking area of FIG. **3***a* in an "open" position;

FIG. **4***b* shows a plan view of the guiding bar of the latch of FIG. **1***c* in the guiding hole of the docking area of FIG. **3***a* in an "intermediate" position;

FIG. **4***c* shows a plan view of the guiding bar of the latch of FIG. **1***c* in the guiding hole of the docking area of FIG. **3***a* in a "closed" position;

FIG. **5** shows the latch in the "operating" position of FIG. **2***c*, with the cover (not shown) of FIG. **2***a* in the "closed" position of FIG. **4***c* and located in the docking area of FIG. **3***a;*

FIG. **6** shows the point of maximum rotation of the latch of FIG. **1***c* when located in the docking area of FIG. **3***a* (cover not shown);

FIG. **7** shows the latch of FIG. **1***c* in the intermediate position of FIG. **4***b* (cover not shown), when located in the docking area of FIG. **3***a*.

OVERVIEW

In overview there is provided a latch for fixing a cover to a unit such as a drive unit, as shown for example in FIG. **1***a*. The latch and cover attach to the drive unit by interacting with a docking area located on the drive unit. The docking area comprises a recess and is designed and shaped to enable fixing of the latch and cover to the drive unit without the use of adhesive or other traditional fixings, such as screws.

To fit the cover and latch to the driving unit, a sliding movement of the cover with respect to the drive unit is required. This movement allows hooks located on the cover to enter recesses in the drive unit. It also actuates the latch to lock it into position within the docking area. The interaction of the drive unit, the latch and the cover prevents the release of the cover from the drive unit without a release rotation of the latch for example by a screwdriver. As such, when the cover slides over the docking area on the drive unit it is locked into place by a combination of the latch and the hooks on the cover.

On rotating the latch in a release direction for example with a screwdriver, the interaction of two arms on the latch, the cover and the docking area causes the cover to automatically slide off, thereby removing the hooks from the recesses in the drive unit and allowing the cover to be removed.

DETAILED DESCRIPTION

The latch mechanism disclosed herein can be better understood with respect to the figures. The latch mechanism system comprises three main elements: a latch **100**, a cover **200** and a docking area **300**.

The interaction of the latch **100**, the cover **200** and the docking area **300** of a drive unit is represented in the flow diagram shown in FIG. **1***b*. The latch **100** is first inserted into, and then securely fitted to, the cover **200** without the aid of any additional fixing parts such as screws. This fitting of the latch **100** is achieved through a rotation of the latch in situ, after it has been inserted at least partially into an opening in the cover **200**. This rotation causes movement of two latch arms that interact with the cover **200** until the latch arms are located in non-return positions within the cover, resulting in a permanent fixing. The cover **200** is then fitted to the drive unit by a manual sliding motion until an outer face of the cover **200** lies substantially flush with an adjacent outer surface of the drive unit. The cover **200** fixes on to the drive unit due to the interaction of the latch **100** and the cover **200** with features within a docking area comprised in the drive unit during the sliding motion.

The cover **200** has a structure which can include hooks **214** that slide into the drive unit such that, when the cover **200** slides over the docking area **300** of the drive unit, the hooks **214** enter retention holes **308** in the drive unit and thereafter the cover **200** can only be removed from the drive unit by an opposite sliding motion followed by a lifting motion. However, the sliding motion during fitting of the cover **200** also causes the latch to rotate and engage with the drive unit. Therefore the cover **200** can only be slidably removed by an opposite rotation of the latch **100** for example using a screw driver. The opposite sliding motion of the cover is provided automatically by the interaction of the latch **100** with the cover **200** and docking area **300** upon such an opposite rotation of the latch **100**.

The latch **100** shown in FIG. **1***c* is a mechanical device used for fitting a cover **200** to a drive unit. The latch **100** comprises a body **102**, an edge **103**, a release arm **104**, a stopping arm **106**, a guiding bar **108** and a central protrusion **110**. In the latch shown in FIG. **1***c*, the body **102** is a circular disk comprising a top face, a bottom face and an edge **103** defined between the top and bottom faces. The release arm **104** is a relatively thin, substantially L-shaped arm extending from the edge **103** of the body **102** with the longer branch of the L-shape extending in a direction substantially tangential to, and coplanar with, the body **102**. The stopping arm **106** is a relatively thin, curved and tapered arm initially extending in the same direction as, and located proximal to, the longer branch of the L-shaped release arm **104**. The curvature of the stopping arm **106** causes it to deviate away from the release arm **104** along its length, as shown in FIG. **1***c*.

The guiding bar **108** protrudes outwardly from the bottom face of the body **102**, as shown in FIG. **1***c*. The guiding bar **108** is substantially rectangular in cross section, wherein the length of the rectangle extends along the diameter of the body **102**. In FIG. **1***c* the length of the guiding bar is aligned, along the diameter of the body **102**, with a point on the edge **103** at which the release arm **104** attaches to the body **102**. The width of the guiding bar **108** is designed such that it fits through a guiding hole **202** in the cover **200**, shown in FIGS. **4***a*-**4***c*, as described in more detail below.

The central protrusion **110** protrudes upwardly from the top face of the latch body **102**, as shown in FIG. **1***c*. The central protrusion **110** is a cylindrical protrusion with an annular wall and substantially circular upper face. It is coaxial with the circular body **102**, protrudes perpendicular to the plane of body **102**, and has a diameter less than that of the body **102**. The central protrusion **110** has a slot defined in its upper face. In FIG. **1***c*, the slot **112** extends across the diameter of the central protrusion **110** and is shaped to accommodate the head of a flat head screwdriver. The slot **112** may be orientated such that it lies parallel to the length of the guiding bar **108** (located on the opposite face of the latch body **102**), but may alternatively be orientated in any direction across a diameter of the central protrusion **110**. The slot **112** may extend across the entire diameter of the central protrusion **110** or only across a part of it. In another embodiment, the slot **112** is shaped to accommodate the head of a Philips screwdriver. Alternatively, the shape of the slot **112** can be chosen to enable inter-engagement between the slot and another type of tool to allow the tool to rotate the central protrusion **110**, via the slot **112**. In an embodiment, the central protrusion **110** does not comprise a slot **112** and is shaped to allow a tool to rotate the central protrusion **110** directly. For example, the central protrusion **110** may not be cylindrical, but may be hexagonal such that it can be rotated by a spanner or any other appropriate tool known in the art.

Referring again to FIG. **1***c*, lugs **114** are provided at a top end of the central protrusion **110**. The lugs **114** extend radially outward from a top part of the annular wall of the central protrusion **110**. In an embodiment, there are two lugs **114** located diametrically opposite one another on the top part of the annular wall, positioned such that the diameter defined between the two lugs **114** lies perpendicular to the length of the guiding bar **108**. In another embodiment, the central protrusion **110** only has one lug **114** extending from its annular wall. As will be understood further from the description below, the lug(s) **114** can instead be arranged to be parallel to, or indeed to lie in any other orientation with respect to, the guiding bar **108**.

The cover **200** is shown in FIG. **2***a*. The cover comprises an opening **202** for receiving the latch central protrusion **110**, a latch receiving area **204** surrounding said opening **202**, a guiding structure **206**, a frame **212**, hooks **214**, a stopping lug **216**, and a recess **218**.

The cover **200** is substantially planar and rectangular in the embodiment of FIG. **2***a*. The frame **212** is a relatively thin structure located around the perimeter of the cover **200**. The frame **212** comprises an upper end, located on an upper edge of the cover **200** nearest the latch receiving area **204** of FIG. **2***a*, two side ends located on either side of the cover **200**, and a lower end located opposite the upper end. In an embodiment, the frame **212** is raised such that it extends inwardly, perpendicular to the cover **200**. One or more sections of the frame **212** can be raised relative to the perimeter of the cover **200** such that they extend inwardly, perpendicular to the cover **200** and sit within the drive unit when the cover **200** is fitted on to the drive unit. When the cover **200** is substantially flush with the drive unit, the one or more raised sections of the frame **212** abut against an inner wall of the drive unit, allowing any side load applied to the edges of the cover **200** to be spread over the cover **200**. The raised sections of the frame **212** also act as location features to facilitate correct placement of the cover **200** on the drive unit.

In another embodiment, the raised sections of the frame **212** sit outside the drive unit such that, when the cover **200** is substantially flush to the drive unit, the raised sections of the frame **212** abut with an outer wall of the drive unit. In another embodiment, the frame **212** is not raised and lies substantially flat with the cover **200**.

In an embodiment, two hooks **214** are located at the corners where the side ends of the frame **212** meet the upper end of the frame **212**. The two hooks **214** extend inwardly perpendicular to the plane of the cover **200** and then bend substantially at a right angle away from, and parallel to, the length of the cover **200**. The shaping of the hooks **214** is such that they interact with retention holes **308** on the drive unit. When the cover **200** is fitted to the drive unit, the hooks **214** enter the retention holes **308**.

The opening **202** is a hole in the cover **200**, sized and shaped to receive the top end of the central protrusion **110** of the latch **100**, allowing the insertion of the central protrusion **110** therethrough. Therefore, in FIG. **2***a* the opening **202** is a circular hole with two extended regions located on opposite sides of the circular hole, designed to match the two lugs **114** located on opposite sides of the central protrusion **110** of the latch **100**. As such the central protrusion **110** and lugs **114** are able to pass through the opening **202** from the inner surface of the cover **200** until the lugs **114** protrude from the opposite, outer face of cover **200**. This insertion causes the latch **100** to align with, and therefore sit within, the latch receiving area **204** of the cover **200**. In operation, once the central protrusion **110** of the latch **100** has been inserted into the opening **202**, the user must rotate the central protrusion **110** in order to lock the latch **100** to the cover **200**. A rotation of the central protrusion **110** causes the lugs **114** to no longer align with the extended regions of the opening **202**, therefore preventing movement of the central protrusion **110** back through the opening **202**.

The latch receiving area **204** of cover **200** is a shallow inset area on the inner surface of the cover **200** shaped to guide the movement of the latch **100** from a non-use position to one or more operating positions. On initial insertion of the central protrusion **110** of the latch **100** into the opening **202**, the latch is in the "relaxed" position. The shape of the latch receiving area **204** is such that, when the latch is in the relaxed position, only rotational movement in one direction, wherein the release arm **104** leads the rotation, is permitted. This advantageously prevents the rotation of the latch **100** in a direction whereby the latch **100** would not perform its intended function. This can be further understood from FIG. **2***b* which shows the latch **100** in the "relaxed" position.

The guiding structure **206** is a raised projection on the inside surface of the cover **200**, located along an edge of the latch receiving area **204**, distal to the opening **202**. The guiding structure **206** has an upper portion defining a guiding edge **210** and a lower wedge-shaped portion **208** for locating the distal end of the stopping arm **106**, as described in more detail below and as shown in the figures.

On rotation of the latch **100** from the "relaxed" position, the stopping arm **106** moves within the latch receiving area **204** in the permitted direction until a distal end of the stopping arm **106** reaches the guiding structure **206** on the perimeter of the latch receiving area **204**. The shape of the guiding structure **206** is such that, upon the stopping arm **106** reaching the guiding structure **206**, further rotation of the latch causes the stopping arm **106** to reach a point of no return. Therefore any further rotation of the latch **100** can only proceed further in the same direction of rotation. This control of the rotational direction is achieved due to the shape of the guiding structure **206**, as described herebelow:

The guiding structure **206** juts into the latch receiving area **204**, thereby reducing the space available for rotation of the stopping arm **106**. The lower, wedge-shaped portion **208** of the guiding structure **206** is sloped and is aligned such that movement of the stopping arm along the wedge-shaped portion **208** is only possible if the curved stopping arm **106** is bent or compressed. Rotation of the latch **100** causes the stopping arm **106** to move along the lower portion of the guiding structure **206**, simultaneously bending as it moves. This bending creates a compressive force in the stopping arm **106** which, when the stopping arm **106** has passed over the lower portion of the guiding structure **206** and reaches a lower end of the guiding edge **210**, where it once again has sufficient space in which to move without bending, reverses the direction of rotation of the latch **100**. This pushes the stopping arm **106** back towards the lower portion of the guiding structure **206**. However, the wedge-shaped lower portion **208** has its thick end located proximal to the lower end of the guiding edge **210** and orientated with respect to that guiding edge so as to form a "seat" for the distal end of the stopping arm **106** therebetween. When the stopping arm **106** has passed the wedge-shaped portion **208** and reached the guiding edge **210**, the stopping arm **106** therefore relaxes and rests in the "seat" provided by the thick end of the wedge-shaped portion **208**. At this point the latch **100** is in the "operating" position as shown in FIG. **2***c*, and the guiding bar **108** is at an angle to the length of the cover **200**. Due to the "seat" provided by the wedge-shaped portion **208** and the direction of curvature of the stopping arm **106**, the latch **100** is unable to return to the "relaxed" position once it reaches the "operating" position.

Since the latch **100** is unable to return to the "relaxed" position once it reaches the "operating" position, it is also unable to return to a position whereby the lugs **114** of the latch **100** align with the extended regions of the opening **202**. As such, once the latch reaches the "operating" position it becomes permanently fixed to the cover **200**. An advantage of the permanent fixing of latch **100** to cover **200** is that there is no need to re-attach the latch once it has been fixed into its "operating" position. Additionally, the fixing requires no additional parts, for example screws, that could get lost and add additional time to the fixing process. Therefore the permanent attachment of the latch **100** to the cover **200** is quick and simple.

The guiding edge **210**, defined by the upper portion of the guiding structure **206**, is substantially straight and is aligned substantially parallel to the length of the cover **200**. Rotation of the stopping arm **106** from the "operating" position, shown in FIG. **2***c*, towards the upper end of the cover **200** forces the distal end of stopping arm **106** to bend and move along the guiding edge **210**. The further the latch **100** is rotated, the more the stopping arm **106** bends and moves along the guiding edge **210**. The length of the guiding edge **210**, and the length and flexibility of the stopping arm **106**, are such that it is not possible to turn the latch **100** to a position whereby the end of the stopping arm **106** moves past a top end of the guiding edge **210**. Due to the bending of stopping arm **106**, once the rotational force on the latch **100** is released the stopping arm **106** moves back down the guiding edge **210** until it falls back into the seat between the guiding edge **210** and the wedge-shaped portion **208**, thereby returning to the "operating" position. This means that, once the latch **100** is securely fitted to the cover **200**, it is biased towards the "operating" position, which it needs to be in to enable the cover **200** to be fitted to a drive unit.

According to an embodiment, the guiding edge **210** of the guiding structure is located on the docking area **300** of the drive unit, instead of being an inner surface of the cover **200**. In this embodiment the distal end of the stopping arm **106** can only move along the guiding edge **210** when the cover **200** is fitted over the drive unit.

The raised nature of the guiding structure **206** is advantageous in that it removes the risk of the bent stopping arm **106** slipping out of the latch receiving area **204** when the latch **100** is being rotated. The guiding edge **210** may be any shape that includes a substantially flat edge such that the end of stopping arm **106** may move along it. The location of the guiding edge **210** with respect to the opening **202** in the cover **200** must be such that the stopping arm **106** only has sufficient space to move along the guiding edge **210** if it is bent or compressed.

The stopping lug **216** is a small, raised rectangular object protruding from the frame **212** of the cover **200** and located proximal to the opening **202**. The stopping lug **216** extends downwardly away from the upper end of the frame **212** and substantially parallel to the length of the cover **200**, towards the opening **202**. The stopping lug **216** is positioned to act as a barrier, impeding movement of the release arm **104** past the stopping lug **216** during rotation of the latch **100**. It is located, shaped and sized relative to the release arm **104** so that the maximum rotation of the latch **100** is achieved when the guiding bar **108** lies substantially parallel to the length of the cover **200**. At this point, the release arm **104** makes contact with the stopping lug **216** and further rotation towards the upper end of the cover **200** is impossible. This feature is important for the process of fitting the cover **200** to the drive unit, as described below. The shape of the stopping lug **216** may instead be non-rectangular, provided that it acts to stop further rotation of the release arm **104**.

The recess **218** is a small cut-away area located in the upper end of the frame **212**. The depth of the recess **218** is such that it lowers a section of the frame **212** to the same level as the latch receiving area **204**. The shape of the recess **218** is such that it allows entry of an obstructing protrusion **306** located on a docking area **300** of a drive unit, as described further below.

Once the latch **100** has been attached permanently to the cover **200** as described above, the cover **200** can be fitted to the drive unit. This is done by sliding the cover **200** into place on the drive unit.

The drive unit includes an exposed region that the cover **200** is designed to fit over when attached to the drive unit. Within that exposed region, there is a docking area **300** as shown in FIG. **3***a*. The docking area **300** comprises a guiding hole **302**, a terminal area **304** surrounding the guiding hole **302**, an obstructing protrusion **306** and retention holes **308**.

In an embodiment, the terminal area **304** is a shallow, inset region in the docking area **300** shaped to match the shape of the latch receiving area **204** and the guiding structure **206** on the cover **200**. By being an inset region, the terminal area **304** allows a greater interaction between the latch **100** and the docking area **300** since the size and thickness of the latch **100** and guiding structure **206** does not need to be reduced if there are space restrictions. This allows the cover **200** to be thinner if required while still maintaining the same level of interaction in the latch mechanism.

In another embodiment, the terminal area **304** is not inset and is substantially the same level as the docking area **300**. In this embodiment, the docking area **300** is simpler and is therefore easier to manufacture.

The location of the guiding hole **302** on the drive unit corresponds with the location of the guiding bar **108** of the latch **100** on the inner surface of the cover **200**. The guiding hole **302** is a recess located in the docking area **300**. The depth of the guiding hole **302** is sufficient to allow the insertion of the guiding bar **108** therein such that the bottom face of the body **102** of the latch **100** is able to lie substantially flush with the terminal area **304** when the cover **200** is fitted to the driving unit.

The guiding hole **302** is shaped to allow the movement of the cover **200** between two different positions with respect to the drive unit: open and closed. The guiding hole **302** has a lower section and an upper section. It also comprises a slanted region **402** which interacts with the latch **100** to move the guiding bar **108** of the latch **100** from the lower section to the upper section, and a shelf **404** which interacts with the latch **100** to reverse that movement.

When the cover **200** is in the "open" position, the guiding bar **108** sits in the lower section of the guiding hole **302** at an acute angle to the length of the cover **200**, as shown in FIG. **4***a*. The size of this angle is determined by the rotational position of the guiding bar **108** when the latch **100** is in the "operating" position shown in FIG. **2***c*. It is not possible for the guiding bar **108** to sit in the upper section of the guiding hole **302** when the cover **200** is in the "open" position due to an obstructing feature of the cover **200**.

In an embodiment, the obstructing feature of the cover **200** is the hooks **214**. The hooks **214** must align with the retention holes **308** to enable insertion of the hooks **214** therein. This alignment is only possible when the guiding bar **108** sits in the lower section of the guiding hole **302**.

In another embodiment, the obstructing feature is achieved by a portion of the cover **200** being designed to slide into a recess in the drive unit when the cover **200** is slid into position as described below. Entry into the recess is only possible when the cover **200** is slid such that the guiding bar **108** moves

from the lower section of the guiding hole **302** to the upper section of the guiding hole **302**.

When the cover is slid into position, a force towards the upper section of the guiding hole **302** is applied to the guiding bar **108**. This comes from the user sliding the cover **200** into place on the drive unit. The top right corner of the guiding bar **108** is therefore forced to move along the slanted region **402**, thereby rotating anticlockwise and moving laterally until the guiding bar **108** has moved past the slanted region **402**. As the guiding bar **108** rotates, the end of the stopping arm **106** moves up the guiding edge **210** of the cover **200**. This movement causes the stopping arm **106** to bend in its direction of curvature, creating a counter force in the opposite direction of rotation. At this point, the guiding bar **108** reaches an intermediate position in the docking area **300** as shown in FIG. **4***b*. In this intermediate position, the guiding bar **108** lies parallel with the length of the guiding hole **302**. As additional lateral force is applied, the guiding bar **108** surpasses the shelf **404** and as such is able to allow the latch **100** to rotate clockwise back to its "operating" position, under the influence of the counter force on the stopping arm **106**. At this point, the cover **200** is in a "closed" position whereby the guiding bar **108** sits in the upper section of the guiding hole **302**, shown in FIG. **4***c*.

Movement from the "closed" position of the cover **200** to the "open" position is not possible without the combination of an anticlockwise rotation of the guiding bar **108** and a sliding force. The angle of the shelf **404** is such that the bottom end of the guiding bar **108** is not able to slide down the shelf **404** in response to a sliding force alone. Therefore sliding the cover **200** into place locks it to the drive unit.

The retention holes **308** can also play a part in locking the cover **200** to the drive unit. The retention holes **308** are rectangular slots in the body of the drive unit. The retention holes each lead to a covered recess shaped to receive the right-angle bend of the hooks **214** of the cover **200**. The location of the retention holes **308** corresponds to the location of the hooks **214** of the cover **200**. When the cover is in the "open" position, the hooks **214** rest inside the retention holes **308**. As the cover moves to the "closed" position previously described, the right angle of the hooks **214** causes the hooks **214** to slide into the covered recess and hook into the body of the drive unit such that the cover **200** advantageously cannot be moved in a direction perpendicular to the plane of cover **200**. Therefore, removal of the cover **200** is only possible if a sliding motion is first performed in order to remove the hooks **214** from the recess, back into the retention holes **308**, which in turn must be initiated by rotation of the latch.

In embodiments whereby the frame **212** does not contain hooks **214**, the drive unit does not contain retention holes **308** but may provide an alternative mechanical connection such as a push fit or snap fit between the cover **200** and the drive unit.

An obstructing protrusion **306** of the docking area **300** is positioned such that it fits into the recess **218** in the frame **212** of cover **200** shown in FIG. **2***a*, and protrudes into the latch receiving area **204**. When the cover **200** is in the "closed" position, the latch **100** is in the "operating" position as described previously. The role of the obstructing protrusion **306** is in release of the cover **200** from the drive unit, as will now be described with reference to FIGS. **5**, **6** and **7**.

FIG. **5** shows the latch **100** in its "operating" position, attached to the cover **200** (not shown) in the "closed" position. Further rotation of the latch **100** from the "operating" position toward the upper end of the cover **200** causes the release arm **104** to bend against the obstructing protrusion **306**. FIG. **6** shows the point of maximum rotation of the latch **100** before the cover **200** is released.

The point of maximum rotation is reached when the release arm **104** abuts against the stopping lug **216**, as described above. At this point, both the release arm **104** (against the obstructing protrusion **306**) and the stopping arm **106** (against the guiding edge **210**) are bent. Because it can't rotate any further to release the compression, the bending of the release arm **104** produces a force to push the guiding bar **108**, and therefore the latch **100**, laterally downwards past the shelf **404** via its intermediate position and towards the lower section of the guiding hole **302**. Since the guiding bar **108** is parallel to the length of the guiding hole **302** when in its intermediate position as shown in FIGS. **4***b* and **7** herein, movement into the lower section of the guiding hole **302** is possible once the compressive force in the release arm is strong enough to push the guiding bar **108** past the shelf in the guiding hole **302**. Thereafter, transition from this intermediate position to the "open" position of the cover **200**, characterised by the position of the guiding bar **108** in FIG. **4***a*, is caused by the force resultant from the bending of the stopping arm **106** against the guiding edge **210**. This causes the guiding bar **108** to rotate back clockwise from the intermediate position shown in FIG. **4***b* to the position shown in FIG. **4***a*, as the latch **100** returns to its "operating" position.

So it can be seen that the latch mechanism is highly useful for attaching covers to devices without the need for fixing agents such as screws or adhesive. Therefore the latch mechanism is a simple and safe solution which avoids lengthy cover removal and replacement times, and eliminates the risk of missing parts.

The latch **100** may be made of any suitable material or combination of materials. The material(s) of the release arm **104** and the stopping arm **106** should be resilient such that the bending of either arm is possible but does not lead to permanent deformation of the arm. For example the latch **100** may comprise plastic, metal, or any material providing appropriate properties.

The cover **200** and docking area **300** may be made of any suitable material or combination of materials. The material(s) should offer rigidity. For example the cover **200** and docking area **300** may comprise plastic, metal, wood, or any material that provides rigidity.

Whilst a particular embodiment has been shown in the figures, variants are possible without departing from the inventive concepts described herein. For example, a purpose of the stopping arm is to interact with the guiding structure in order to attach the latch to the cover, but it is possible for the latch to include a different physical feature to achieve this purpose. As another example, a purpose of the release arm is to interact with the stopping lug and the obstructing protrusion to limit the rotation of the latch and provide a force to push the latch laterally downwards, but again other physical features may be present to achieve this purpose.

These and/or other physical features of the particular embodiment described herein may be omitted or may be replaced by alternative features which serve the same (or similar) purpose in fitting a cover to a device such as a drive unit.

The relative terms "upper", "lower", "upwardly", "downwardly", "outwardly", "inwardly", "anticlockwise", "clockwise", "inner", "outer", "top", "bottom" and "lateral" used herein relate to the orientation of the device as shown in the Figures and are employed to facilitate description of the device. They are not intended to be limiting. Similarly, the use of an anticlockwise rotation followed by a clockwise rotation of the latch for fitting the latch and cover to, and removing the latch and cover from, the device is not limiting and could be reversed instead.

The invention claimed is:

1. A latch system comprising:

a latch;

a cover arranged for attachment to said latch;

wherein the latch includes a latch body comprising a stopping arm extending therefrom, the latch body further comprising a projection extending therefrom, wherein when the latch and cover are attached to one another, the projection extends from an inner surface of the cover in a first position; and

a device having a docking area, said docking area being arranged to receive the latch such that said cover may be securely fixed to the device;

wherein said docking area includes a guiding recess comprising a first recess portion and a second recess portion, each recess portion arranged to receive the projection which extends from the latch body;

wherein when the projection is received in the first position in the first recess portion, a sliding movement of the cover causes actuation of the latch so that the projection moves from the first position in the first recess portion to the second recess portion and wherein when the latch is received in the second recess portion, the stopping arm provides a bias force to return the projection to the first position and further sliding movement of the cover is prevented.

2. A latch system as claimed in claim **1** wherein the latch is rotatable with respect to the cover.

3. A latch system as claimed in claim **2** wherein the latch body comprises a release arm extending from said latch body.

4. A latch system as claimed in claim **3** wherein the docking area comprises an obstructing protrusion positioned to abut against the release arm after a predetermined actuation of the latch, wherein said abuttal provides a force to help release the cover from the device.

5. A latch system as claimed in claim **1** wherein the latch comprises a first formation extending from said latch and wherein the cover or the docking area comprises a second, co-operating formation wherein the first formation will contact the second co-operating formation during actuation of the latch, in order to limit the extent of the actuation of the latch.

6. A latch system as claimed in claim **5** wherein the latch body comprises a release arm extending from said latch body, and wherein the first formation extending from the latch is incorporated into the release arm.

7. A latch system as claimed in claim **6** wherein the second formation is a stopping lug.

8. A latch system as claimed in claim **1** wherein the cover or the docking area comprises a guiding structure comprising a first, wedge-shaped portion and a second portion including a guiding edge.

9. A latch system as claimed in claim **8** wherein actuation of the latch causes a distal end of the stopping arm to sit in a seat formed between the wedge-shaped portion and the guiding edge of the guiding structure, thereby locking the latch to the cover.

10. A latch system as claimed in claim **9** wherein an actuation of the latch after said latch is locked to the cover causes the stopping arm to bend and bias the movement of the latch back to a position whereby the distal end of the stopping arm sits in the seat formed between the wedge-shaped portion and the guiding edge.

11. A latch system as claimed in claim **1** wherein the latch comprises a slot to enable rotation of the latch via a tool.

12. A latch system as claimed in claim **11** wherein the slot is shaped to accommodate the head of a screwdriver.

13. A latch system as claimed in claim **1** whereby the latch comprises opposite first and second faces, said first face having the projection and said second face having a protrusion thereon.

14. A latch system as claimed in claim **13** wherein the latch comprises a slot to enable rotation of the latch via a tool, and wherein the slot is located on the protrusion.

15. A latch system as claimed in claim **14** wherein the slot is shaped to accommodate the head of a screwdriver.

16. A latch mechanism as claimed in claim **15** wherein the protrusion is shaped to be rotatable by a tool directly.

17. A latch system as claimed in claim **1** wherein the cover comprises an opening arranged to receive at least a portion of the latch.

18. A latch system as claimed in claim **1** wherein the cover further comprises one or more hooks extending from said cover.

19. A latch system as claimed in claim **18** wherein the docking area comprises one or more retention holes arranged to receive one or more of the hooks on the cover.

20. A latch system as claimed in claim **1** wherein the first and second recess portions of the guiding recess are arranged offset from one another in the direction of sliding of the cover.

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